APPLE MAGGOT (*RHAGOLETIS POMONELLA*) ADAPTATION FOR CHERRIES IN UTAH

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ABSTRACT.—The apple maggot, *Rhagoletis pomonella* (Walsh) is reported from Utah County, Utah, where it has adapted to sour cherries. It has been taken repeatedly from pheromone traps in the vicinity of hawthorn (*Crataegus douglassii*), but there are no Utah data that suggest it has adapted to apples.

The apple maggot, *Rhagoletis pomonella* (Walsh), was first collected in Utah in 1976 from a Malaise trap in the Willard Basin of Box Elder County, Utah. This site was close to hawthorn, but 5 mi from the nearest apple trees. The apple maggot was not reported from Utah again until 1983 when the Utah Department of Agriculture (Edward J. Bianco, personal communication) took numerous specimens in the Mapleton (Utah County) area while trapping cherries for the western cherry fruitfly (*Rhagoletis indifferens* Curran). Trapping for apple maggots was intensified on cherries and apples in 1984.

Continuous trapping (Pherecon® AM traps) in an unsprayed cherry orchard (1984) resulted in an emergence curve that seemed optimally synchronized with sour cherries (Fig. 1). Emergence was somewhat late for sweet cherries, unless they were left on the trees or were late varieties (e.g., Lambert). Perhaps the most interesting observation was the general paucity of adults collected when most commercial apples in Utah were ripening. There was a slight increase in the number of trapped specimens in late September that may have resulted from a partial second generation, but this has not been confirmed. Early apples would be expected to ripen dur-ing the latter part of this emergence curve (Fig. 1).

The apple maggot has apparently become adapted to cherries in the Mapleton, Utah, area. Although it is tempting to suggest genetic adaptation has occurred in the population, it is more likely the adaptation to cherries is a phenological phenomenon within the population. Phenological adaptation of this type by apple maggots is certainly not new. It has been reported by Illingworth (1912), Pickett and Neary (1940), Bush (1969), Reissig and Smith (1978), Diehl (1983), and others. Bush (1974), Reissig and Smith (1978), Prokopy et al. (1982), and Diehl (1983) suggested this allochronic isolation was important in evolution of the two sympatric host races in eastern North America, one for apples and the other for hawthorn (*Crataegus* spp.).

Although we have found synchrony in apple maggot emergence with sour cherry development in Utah, it is not yet clear if an alternative host is present that provided the original source of apple maggots. Our work in 1985 has demonstrated a possible alternate host (hawthorn, *Crataegus douglassii*) that could provide this niche (Allred, unpublished data). It seems reasonable to suppose that allochronic isolation could develop in two directions from hawthorn in Utah:

Sour Cherry (early emergence) ——— Hawthorn

Hawthorn ——— Apple (late emergence)

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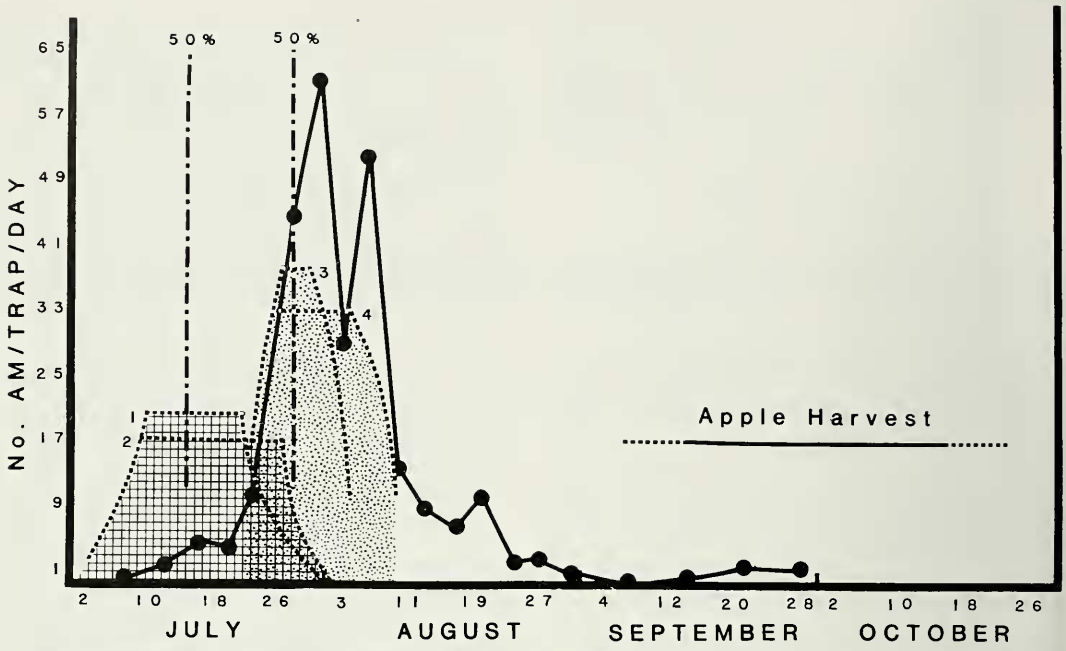

Fig. 1. Emergence curve for apple maggot (*Rhagoletis pomonella*) and its synchrony with sweet (cross-hatch) and sour (stipple) cherry harvest in central Utah, 1984. A 50% harvest for each is indicated.

This possible phenomenon seems even more plausible when one considers the fact that almost all Utah apples are the late, hard varieties—Golden Delicious, Red Delicious, and Roman Beauty. The economic implications of a possible synchronization with sour cherries, hawthorn, and apples are substantial.

Such an extended synchronization to include three fruits by the apple maggot in Utah seems rather unlikely, if data reported in eastern North America are transferrable to our population. Bush (1969) and Reissig and Smith (1978) reported that apple host races emerged several weeks before hawthorn host races, with emergence peaks from 4 to 5 weeks apart. Since females are likely to develop and retain host fidelity after oviposition has started (Prokopy et al. 1982a,b), it is reasonable to suppose host adaptation for domestic fruits that mature before hawthorn is more likely than for fruits that mature after hawthorn. Accordingly, adaptation to early-maturing apples grown in much of eastern North America and to cherries in Utah is more likely than adptation to the hard apple varieties that mature in late summer.

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